Citation:

Phelan S, Wyatt H, Nassery S, Dibello J, Fava JL, Hill JO, Wing RR. Three-year weight change in successful weight losers who lost weight on a low-carbohydrate diet. *Obesity (Silver Spring)*. 2007 Oct;15(10):2470-7.

PubMed ID: 17925473

Study Design:

Prospective Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

The purpose of this study was to evaluate long-term weight loss and eating and exercise behaviors of successful weight losers who lost weight using a low-carbohydrate diet.

Inclusion Criteria:

- Enrollment in National Weight Control Registry between 1998-2001 for at least 3 years: reported ≥30-lb weight loss and ≥1 year weight loss maintenance
- Low-carbohydrate diet participants identified based on self-reported use of a low-carbohydrate diet (specifically: a weight history timeline administered to assess weight changes before study enrollment). Low-carbohydrate regimens include Atkins' diet, South Beach diet, "low carb" diet.

Exclusion Criteria:

- Authors stated that "exclusions were not made based on medical factors or use of other concomitant methods for weight loss (e.g., exercise)".

Description of Study Protocol:

Recruitment

- Enrolled in National Weight Control Registry (NWCR) between January 1998-2001, at which time the Atkins' diet website encouraged members to enroll in the Registry and provided a link to the Registry's Website.
- NWCR participants recruited from coverage and advertisements in various media, including newspaper, magazine, radio and television. NWCR participants must have lost at least 13.6 kg (30 lb) and kept it off for ≥1 year.
- NWCR registrants complete annual questionnaire-based assessments of weight and/or behavioral factors.

Design: Prospective cohort study

Blinding used (if applicable): not applicable

Intervention (if applicable)

- "Low-carbohydrate diet" adherents followed self-reported "low-carbohydrate" diet (parameters not defined)

Statistical Analysis

- Independent t tests and x^2 tests used to compare differences in demographic variables between the low-carbohydrate and other Registry member groups
- Descriptive statistics presented as either mean ± SD for continuous measures or percentages for categorical responses.
- x^2 tests also used to compare differences in weight loss methods and individual restraint scale items between the low-carbohydrate and other Registry member groups
- Series of 2 x 2 ANOVAs conducted to evaluate group differences as a function of dropout status on demographic variables
- 2-sample Kolmogorov-Smirnov used to compare groups on distribution of weight change

Data Collection Summary:

Timing of Measurements

- Behavioral measurements were administered at entry into the study and at 1- and 3-year follow-ups

Dependent Variables

- 3 year weight loss/gain
- Kcal/d consumption
- Calories in weekly physical activity
- Calories from fat
- Calories from saturated fat
- Calories from monounsaturated fat
- Calories from polyunsaturated fat
- Dietary restraint

Independent Variables

- Low-carbohydrate diet
- Any other dietary regiment that permitted retention in NWCR

Control Variables

Description of Actual Data Sample:

Initial N: 891 subjects

Attrition (final N):

- Final n=891 (completed 3-year follow up)
- Low-carbohydrate diet n=96
- Other dietary strategies n=795

Age:

- Low carb age = 49.0 ± 11.7

- Other registry member age = 49.5 ± 12.8

Ethnicity:

- Low carb % white = 97.9
- Other registry member % white = 94.8

Other relevant demographics:

- Low carb % male = 54.2
- Other registry member % male = 27.0

Anthropometrics

- Low carb BMI = 26.6 ± 3.9
- Other registry member BMI = 25.7 ± 5.1

Location:

- NWCR members are from the United States; specifics for this study not elucidated

Summary of Results:

Key Findings

Only 10.8% of participants reported losing weight after a low-carbohydrate diet

At entry into study, low-carbohydrate diet users reported consuming more:

- Kcal/d (mean ± SD, 1895 ± 452 vs. 1398 ± 574)
- Fewer calories in weekly physical activity (1595 ± 2499 vs 2542 ± 3201)
- More calories from fat (64.0 ± 7.9% vs. 30.9 ± 13.1%)
- Saturated fat (238 ± 4.1 vs 10.5 ± 5.2)
- Monounsaturated fat (24.4 ± 3.7 vs. 11.0 ± 5.1) and
- Polyunsaturated fat (8.6 ± 2.7 vs. 5.5 ± 2.0) and
- Less dietary restraint (10.8 ± 2.9 vs 14.9 ± 3.9) compared with other Registry members
- These differences persisted over time

No differences in 3-year weight regain were observed between low-carbohydrate dieters and other Registry members in intent-to-treat analysis (7.0 ± 7.1 vs. 5.7 ± 8.7 kg)

Author Conclusion:

In summary, 10% of the NWCR lost their weight with a low-carbohydrate diet. There were no significant differences in weight regain between these individuals and other Registry members, suggesting that it is possible to be successful at long-term weight loss with a variety of different dietary approaches. Future studies should determine whether the health benefits achieved by those

who lose significant amounts of weight with a low-carbohydrate regimen are comparable to the benefits achieved by other successful weight loss maintainers.

Reviewer Comments:

Authors do not disclose what if any inclusion criteria constitutes "low-carbohydrate" diet; "low-carbohydrate" diet seems to only be self-reported choice by NWCR participants.

Authors note that the Registry is composed of self-selected participants who were predominantly white and well educated and thus may not generalize to the population at large.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions		
1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	???
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes

2.4.	Were the subjects/patients a representative sample of the relevant population?	???
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes

5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	???
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	???
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	???
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes

	8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
	8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
	8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
	8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
	8.6.	Was clinical significance as well as statistical significance reported?	Yes
	8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**		Yes
	9.1.	Is there a discussion of findings?	Yes
	9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**		Yes
	10.1.	Were sources of funding and investigators' affiliations described?	Yes
	10.2.	Was the study free from apparent conflict of interest?	Yes